
Faculty of Cognitive Sciences and Human Development

# DEVELOPMENT OF LEARNING MODULE IN TEACHING 'BRAIN BASIC' AND 'MOVEMENT' AMONG PRIMARY SCHOOL STUDENTS

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Grade: A

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Final Year Project Report ☒

Masters ☐

PhD ☐

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# DEVELOPMENT OF LEARNING MODULE IN TEACHING 'BRAIN BASIC' AND 'MOVEMENT' AMONG PRIMARY SCHOOL STUDENTS

ENNEVIEENATASIA ANAK SAIN

This project is submitted
in partial fulfilment of the requirements for a
Bachelor of Science with Honours
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The project entitled 'Development of learning module in teaching 'Brain Basic' and 'Movement' among primary school students' was prepared by Ennevieenatasia anak Sain and submitted to the Faculty of Cognitive Sciences and Human Development in partial fulfillment of the requirements for a Bachelor of Science with Honours (Cognitive Science).

Received for examination by:

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(Assoc. Prof. Dr Norsiah Fauzan)

Date:
8 JUNE 2018

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| Grade |
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## ABSTRACT

DEVELOPMENT OF LEARNING MODULE IN TEACHING 'BRAIN BASIC' AND 'MOVEMENT' AMONG PRIMARY SCHOOL STUDENTS

This research aims to study the development of learning module and creating videos for the teaching of human 'Brain Basic' and 'Movement' among the primary school children. The main objective for this study was to describe the processes of developing and creating videos on 'Brain Basic' and 'Movement' among primary school children. This study also intends to assess the efficacy of using the video and learning module on teaching 'Brain Basic' and 'Movement' among primary school children. The methods used are interviewed and development of the materials. Three students takes part in teaching lesson and were interviewed at the end of the session. After conducting the study, the process in developed module and videos were mainly from Bloom's Taxonomy model and integrated curriculum theory. In addition, the usage of module and video in teaching were effective to the students.


*Keyword*: learning module, brain, neuroscience

## ABSTRAK

PEMBANGUNAN MODUL PELAJARAN DALAM PENGAJARAN 'ASAS OTAK' DAN 'PERGERAKAN' DALAM KALANGAN BUDAK SEKOLAH RENDAH

*Penyelidikan ini bertujuan untuk mengkaji perkembangan modul pembelajaran dan membuat video untuk pengajaran 'Asas Otak' dan 'Pergerakan' manusia di kalangan kanak-kanak sekolah rendah. Objektif utama kajian ini adalah untuk menerangkan proses membina dan mencipta video mengenai 'Asas Otak' dan 'Gerakan' di kalangan kanak-kanak sekolah rendah. Kajian ini juga bertujuan untuk menilai keberkesanan penggunaan video dan modul pembelajaran dalam mengajar 'Otak Asas' dan 'Pergerakan' di kanak-kanak sekolah rendah. Kaedah yang digunakan ialah temu bual dan pembangunan bahan-bahan pembelajaran. Tiga pelajar mengambil bahagian dalam pengajaran dan pembelajaran dan ditemuramah di akhir sesi. Selepas menjalankan kajian ini, proses dalam modul dan video yang dibangunkan adalah daripada model Taksonomi Bloom dan teori kurikulum bersepadu. Di samping itu, penggunaan modul dan video dalam pengajaran adalah berkesan kepada pelajar.*



*Kata kunci: modul pembelajaran, otak, neurosains*

# CHAPTER ONE

# INTRODUCTION

This chapter introduced the overview, background of the study, problem statement and definition of terms. This is followed by research objectives and research questions related to this research.

## Background Study

The Brain Awareness Week (BAW) Campaign is a collaboration between IBRO (International Brain Research Organization) and other multiple organisation, a worldwide campaign targeting at increasing public and community awareness on neuroscience and the advancement and benefits of brain research (Mwoka, n.d.). Since then, multiple of competition such as Science Olympiad and International Brain has been organized to increase the awareness among the public.

In Malaysia, Brain Bee awareness program was champion and organized by Universiti Sains Malaysia (USM) since 2008. The department of neuroscience of USM have organized multiple of event such as Malaysian Brain Bee Challenge and the community engagement program– B.R.A.I.N. The main motive for the event is aimed at creating awareness of the power of the human brain, discovering its potentials and evolving its capacity.

Universiti Malaysia Sarawak started the journey since 2015 involving secondary school around Sarawak. The outreach program was intended to contribute to students in Sarawak of the understanding on neuroscience via Malaysia Brain Bee Challenge (MBBC) where selected student win to represent Sarawak at the national level. In 2016, Benjamin Wong Yi Ren, a student from SMK Methodist Sibu become the top ten participants at the International Brain Bee (IBB) Championship competition Copenhagen, Denmark.

The team was under the University Community Transformation Centre (UCTC) Universiti Malaysia Sarawak (UNIMAS) through collaboration between UNIMAS and Universiti Sains Malaysia (USM). The project was one of ways to increase the interest among Sarawak students in the field of neuroscience especially the learning of the brain.

Not only that, Academy of Sciences Malaysia (ASM) introduce the rise of neurotechology which is the controls of technical and computational implements to measure, examine and re-wire the nervous system to recognize the assets of nerve cell actions, capable of detect illness, bring back neurological functions and can even control by exterior devices (ASM, 2017). This technology was introduced in Science & Technology: Foresight Malaysia 2050 which was not only used in medical field, but also in financial field. law administration and education.

With entering the Industry 4.0, this new technology and knowledge of neuroscience should be introduced as early as possible. Country like USA exponentially introduce Neuroscience for kids, a website which provide information and fun activities about neuroscience and Biokids is for children to learn biology and Quran simultaneously (Ibrahim, Mat, Noor, Arifin, & Norizan, 2017). Not only that KindyRoo introduced in Singapore which helps babies as early as 6 weeks old to until 6 years old to develop robust neuro-physiological basic for future education and thinking abilities.

Neuroscience should be used as an instrument in educational strategy as Bostrom and Sandberg (2009) state that education is consistently fruitful cognitive enhancer of all which can for instead literacy and numeracy can alternate the human brain. Strauss (2003) mentioned that successful teaching is the natural matching part of successful learning and described as a 'natural cognition'.

## Problem Statement

In Malaysia, the national level which is Malaysian Brain Bee Challenge is organized by Universiti Sains Malaysia. The local competition is divided into nine zones: Zone A (Universiti Utara Malaysia), Zone B (Universiti Sains Malaysia, Penang), Zone C (Universiti Malaya), Zone D (Universiti Putra Malaysia), Zone E (Universiti Sains Malaysia, Kelantan), Zone F (Universiti Sultan Zainal Abidin), Zone G (Taylor's University Malaysia). Zone H (UNIMAS) and Zone I (Universiti Malaysia Sabah).

Previously, in Sarawak the competition such as Malaysian Brain Bee Challenge and International Brain Bee Competition on the neuroscience event was led by Zone H coordinator, from UNIMAS. In 2017, the competition involved Kuching, Sibu and Miri which is the urban area and does not involve in the rural area. Hence, the transfer of knowledge is limited due to the enormous area. Consequently, the purpose of developing the module is for the outreach program so that all the children in rural area in Sarawak will have a chance to participate in the competition and subsequently the transfer of knowledge of neuroscience. Furthermore, the learning module will become a guideline for the teachers in teaching the students in the field of neuroscience.

The advancement of new knowledge in neuroscience will have direct implication to various fields such as artificial intelligence, psychology and computer science. It is the high time for the knowledge to be transfer among the students to achieve the Industry 4.0. This is because 60% of current jobs will disappear in the future due to advancement of technology (Education News Update.com, 2018).

By doing so, the researcher can introduce and transfer the knowledge of neuroscience at early age which eventually determine the effectiveness of this learning module.

## Research Objective

### General objective

To study the development of learning module and creating videos for the teaching of human 'Brain Basic' and 'Movement' among the primary school children.

### Specific objectives

This research aims:

- To describe processes of developing and creating videos on 'Brain Basic' and 'Movement' among primary school children.
- To assess the efficacy of using the video and learning module on 'Brain Basic' and 'Movement' among primary school children.

## Research Questions

- What are the processes in the development of human 'Brain Basic' and 'Movement'?
- Did the children feel that they gained knowledge after taking the lesson?

**Definition of Terms**

| Terms | Conceptual Definition | Operational Definition |
|---|---|---|
| Brain | The vital body part in human nervous system which form the central nervous system with spinal cord (Yuste & Church, 2014). | The brain module consists of brain basic and function, nervous system and neuron. |
| Learning Module | A module where a collection of organized data and information are obtained (blackboardhelp.usc.edu, n.d.) | This module consist of brain parts, neuron, nervous system and movement. |
| Movement | An act of moving (Oxford Dictionaries, n.d.) | A learning module which consist of voluntary movements, involuntary movements and complex movements. |
| Neuroscience | A multilevel, multidisciplinary subject comprising morphological, functional and physical studies of the central nervous system (Shulman, 2013) | The module and video development of 'Brain Basic' and 'Movement' |

*Table 1.* Definition of Terms

## Significance of the Study

The research will provide the vital evidence of developing learning module for the teaching of human brain basic and movement among the primary school children age 10-12. This research provides a better insight that it is a best chance to introduce the field of neuroscience at an early age. The teaching professions such as teachers and school administrators, trainers, curriculum planners and textbook bureau of the Ministry of Education can draw inputs from the results of this study. It also have a direct implications to the teachers which can increase their awareness and knowledge about the brain as neuroscience and can improve the quality of life among the community.

# CHAPTER 2

# LITERATURE REVIEW

This chapter serves to give better understanding about the research and the process of developing the learning module for brain basics and movement for the product primary school.

## Tyler's Objective Model

This model is focused on whereby it asses the pre-defined goals and objectives that need to be achieve. The Tyler Model (1949), or referred as the Objective Model comprises of four questions that Tyler classified must be asked for effective classroom instruction:

1. What are the educational goals that the school wants to achieve?
2. How are the educational practices that likely correlated with the accomplish goals?
3. How these educational experiences be effectively organized based on the attain goals?
4. How to calculate the effectiveness of learning experiences?

This can be seen in Gagne (1966) curriculum design which contains four categories:

1. The module content
2. Provide objectives
3. The arrangement of the content
4. Pre-assessment skills


*Figure 1*. Summarise of Tyler's Model

With Tyler's Model and Gauge it pretty much that the curriculum was much wider and it involve deliberate design and the unintentional effects to the curriculum.

Tyler Model also denoted as Rational planning model due to the fact that it is coherent to specify the ends of an activity before engaging in it which sometimes referred to as "means end planning"(Okpokwasili, 2003).

**Bloom's Taxonomy (Revised)**

Bloom's Taxonomy was named after Benjamin Bloom who was developed the model in 1956 (Bloom, Engelhart, Furst, Hill & Krathwohl, 1956). This model used multilayer measure to determine the level of expertise required in attain each student output and performance. It has been found that this module been frequently used in policy making and by schools and teachers in the teaching lessons (Patton, 2018, Muzyak et al., 2018). This model usually referred as Cognitive domain where it stress on recalling and remembering the information that have been learned. The cognitive objectives varied from easy recall of the lesson to highly original and innovative ways of mixing and synthesising new information and ideas (Cullinane, 2009).

This taxonomy was distributed into six levels which were: Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation. This model in the form of hierarchical – the students need the basic foundation about the knowledge and skills at the lower base to achieve the learning at higher levels (Figure 2).

A previous scholar of Bloom, Lorin Anderson redesigned the model and made some changes which were (Figure 3) (Anderson, Krathwohl, Airasian, Cruikshank, Mayer. Pintrich, Raths, Wittrock, 2000):

- changing the names from noun to verb forms
- readjusting the position
- making a processes and levels of knowledge matrix

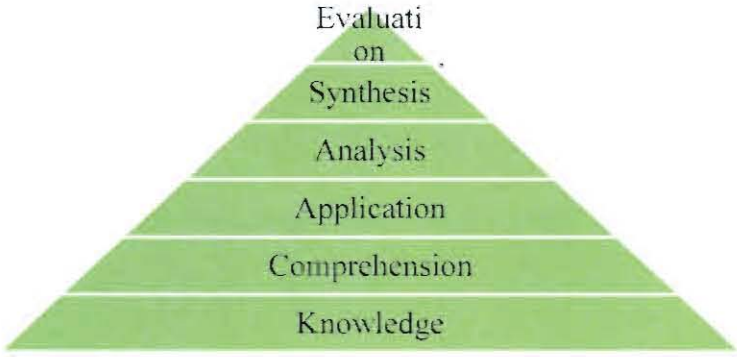


*Figure 2*. Bloom's taxonomy of learning.


*Figure 3*. Revised version of Bloom's taxonomy

The framework can be used as teaching materials to aid equilibrium and assessment quizzes in the class, questions to make sure entirely orders of thinking are implemented in students' learning which includes the features of information searching (Jansen, Booth, Smith, 2009).

This model is an appropriate way to define the notch to the teachers who want the students to comprehend and use perceptions, to prove particular skills, and to have their values, and interests posh. Teachers decide the levels of student expertise so that students able to accomplish (Bloom et al, 1956).

**Piaget Theory of Cognitive Development**

Jean Piaget's theory of intellectual expansion (Flavell, 1963) is well-thought-out a leading theory on cognitive development (Flavell, 1963). This theory is an explanation of cognitive development which divided into four stages for children: sensorimotor, preoperational, concrete and formal.

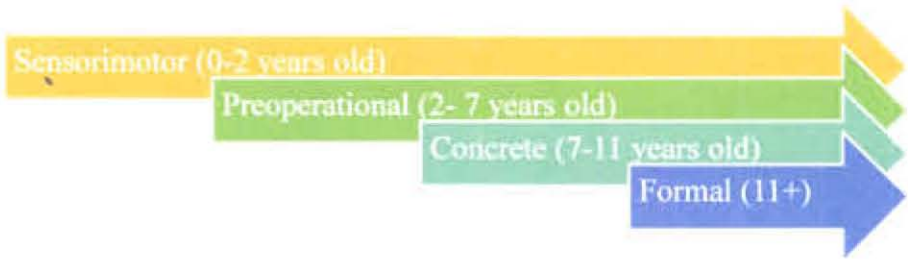


*Figure 4.* Piaget theory of Cognitive Development Chart

Sensorimotor phase starts at birth until two years old. At this stage, the child will shapes an understanding about themselves and truth or environment around them through multiple connections with surroundings and people. They will learn to distinguish between themselves

and other objects. The learning usually in the form of assimilation and accommodation. Assimilation is to organize information and engrossed it into present schema while accommodation is when the object cannot assimilated, modified the schemata to be include with the objects.

Preoperational period which around age two until four, the children cannot conceptualize abstract and really wants constant real physical circumstances especially the object is classified in simple ways such as have wheels which would be car and lorry especially by identified the important features of the objects.

Furthermore, at concrete stage (age seven until eleven), the children starts to ponder conceptually and abstract by making reasonable thinking and configurations which clarify based on the children experiences and previous knowledge of the world. In easy way, as physical accumulates, accommodation is increased.

Finally, formal stage (age eleven until fifteen) is where the person is no more needs concrete matters to create a rational judgments and decision. This is due to as cognition finally reached it's for. The children is adept of creating deductive, inductive, and hypothetical reasoning. The thinking at this age is very similar to a grown up adult.

**Video Learning**

Mayer (2001) explained that video is an interactive platform through which two harmonized sensory inputs (visual and auditory) where multiple input present such as picture and sound representation for on-screen print or closed-captioning. Free platform such as YouTube especially the educational videos do upkeep cognitive features which based on the cognitive theory of multimedia learning (Shoufan, 2018). Educational video games (EVGs)

also can act as a medium to motivate and engross students in learning (Marti-Parreno, Galbis-Cordova & Miquel-Romero, 2018). Learning through video can enhance the positive emotion which leads the increase rate of knowledge transfer (Beege, Schneider, Nebel, Habler, Rey, 2018). Watching videos do motivate students' sensory such as eye and hearing where the video transfer the same materials through instantons learning modalities.

**Cognitive theory of Multimedia Learning**

This theory was introduced by Richard E. Mayer and Roxana Moreno (2003) that portrays dual-channel processing that going in learner's mind when using multimedia instructional.



*Figure 5.* Dual-coding theory

Mayer (2010a) explain that the model was a communication which used pictures and words in learning. Five stages involved were: i.) choosing related words from the narration; ii.) pick up relevant images from the presented illustrations; iii.) shaping the words into comprehensible verbal representation; iv.) forming images into a rational visual representation and v.) incorporating the visual and verbal depictions and prior knowledge.

Mayer (2002) believed that students performed better with words and pictures. This because pictures can boosted students' confidence (Lindner, 2018; Molina, Navarro, Ortega,

& Lacruz, 2018). Not only that, when words and pictures are both presented, student are capable of constructing verbal and pictorial mental representations and build bridge between them (Harskamp, Mayer & Suhre, 2007; Mayer, 2002). When using videos, teachers will be able to observes students' reactions about the topic which indeed engaging and insightful (Allam, 2006). The advancement of technology play a vital role in determine how the students learn and attain the goal tests (Fundi, 2015).